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Nomenclatural and taxonomic notes on *Calvatia* (*Lycoperdaceae*) and associated genera

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Abstract — Various nomenclatural aspects pertaining to author citations, orthography and the validity of names in the genus *Calvatia,* and, in one instance, *Bovista,* are discussed. The name *Calbovista subsculpta* var. *fumosa* is validated and the biogeographic status of *Calvatia gigantea* in southern Africa is discussed. The name *Calvatiella lioui* is lectotypified.

Key words — *Bovista cacao, Calvatia sericella, Calvatia sinclairii, Calvatia versipora, Calvatiella lioui*

Introduction

In the course of our ongoing study of the genus *Calvatia* Fr. in southern Africa, we are continually encountering noteworthy facts and odd snippets of information, some of which—especially those pertaining to non-southern African taxa—are unlikely to find mention elsewhere in our papers on the southern African *Lycoperdaceae*. Individually, some items might perhaps be regarded as rather trivial, but collectively it all adds up to a substantial body of information that might be of value to other workers in the field as well as, in a few cases, even serve as stimulus for further investigation. A selection of those (often purely nomenclatural) items of information is presented in this miscellany of short notes. All references to the International Code of Botanical Nomenclature (ICBN) pertain to the 'Vienna Code' (McNeill et al. 2006).

1. Validation of the name *Calbovista subsculpta* var. *fumosa*

Calbovista subsculpta* var. *fumosa A.H. Sm. ex J.C. Coetzee & A.E. van Wyk, **var. nov.** MycoBank 513113

"*Calbovista subsculpta* var. *fumosa*" A.H. Sm., Mycopathol. Mycol. Appl. 26: 396. 1965, **nom. inval.**

Description (Latin and English) — Smith (1965).

Type — United States, Idaho, Bonner Co., Dickensheet Campground, Priest River, Kaniksu National Forest, gregarious under *Pinus contorta*, A.H. Smith 71347, 21 October 1964. [**Holotype**, MICH].

Key characters — See Smith (1965).

Comments — When Morse (1935) erected the monotypic genus *Calbovista,* no Latin diagnosis or reference to any previously published Latin diagnosis was provided, making the names "*Calbovista*" Morse and "*Calbovista subsculpta*" Morse invalid according to ICBN Art. 36.1. Consequently, the varietal name "*Calbovista subsculpta* var. *fumosa*" (Smith 1965) was also invalid in terms of ICBN Art. 43.1, which rules that the name of a taxon below the rank of genus is not validly published unless the name of the genus or species to which it is assigned has been validly published. Although Seidl (1995) validated Morse's invalid generic and specific names, no consideration was given to Smith's varietal name. That situation is here rectified by formally validating the name.

2. The names *Calvatia umbrina* and *Bovista cacao* revisited

Although the fungus that has gone under the above two names was properly described in Lloyd (1904a: 2), it is evident from Lloyd's discussion that he regarded *Calvatia umbrina* as merely provisional, thereby making "*Calvatia umbrina*" Lloyd invalid according to ICBN Art. 34.1(b). Nonetheless, despite this and despite Stevenson & Cash's (1936) exclusion of *C. umbrina* from their catalogue of new fungus names proposed by Lloyd, Zeller & Smith (1964) continued to use Lloyd's invalid name.

This error was perpetuated by Ponce de León (1975) when he transferred *C. umbrina* to the genus *Bovista.* Ponce de León accepted Lloyd's provisional name but, realising that the epithet *umbrina* was unavailable in *Bovista* (having been used previously by Bottomley (1948) for a different fungus), proposed the new name *Bovista cacao* P. Ponce de León. However, since *C. umbrina* is invalid and thus has no status under the ICBN, Ponce de León should not have treated *Bovista cacao* as a nomen novum, but as a species novum which, in the absence of a Latin diagnosis, must be rejected as invalid according to ICBN Art. 36.1.

A re-examination of the original (and apparently only) collection of this fungus [U.S.A., California, Mountain View, on the ground, Erhorn s.n. (Lloyd Myc. Coll. 20679, BPI)] is required and, if found to be a good species, the name needs to be validated. Kreisel (1992, 1994) did not include this fungus in his survey and key to the genus *Calvatia.*

3. On the identity of *Calvatia sericella*

Calvatia sericella (Berk.) Lloyd ex J.A. Stev. & E.K. Cash, Bull. Lloyd Libr. Bot. (35): 173. 1936.

≡ *Lycoperdon sericellum* Berk., Hooker's J. Bot. Kew Gard. Misc. 3: 171. 1851.

Holotype — India, Darjeeling, 7000 feet, on the ground, Hook fil. 32. [K!]

As far as could be ascertained, the combination *Calvatia sericella* was first validly published in Stevenson & Cash (1936). They ascribed the combination to Lloyd (1904b: 2), but as Lloyd did not definitely associate the epithet with the genus name, he failed to create a combination according to ICBN Art. 33.1 + Ex. 2. Demoulin (1971) believed that *C. sericella* probably was conspecific with *Calvatia excipuliformis* (Scop. : Pers.) Perdeck, although Lloyd (1904b) and Van Overeem (1927) suggested a relationship with *Calvatia gardneri* (Berk.) Lloyd [= *Calvatia pyriformis* (Lév.) Kreisel]. However, after having examined the type material at K (consisting of three specimens in the *Lycoperdon sericellum* type folder but filed under *C. excipuliformis*), we are convinced that it represents neither *C. excipuliformis* nor *C. pyriformis* and—based on macroscopic similarity, spore morphology, and the presence of conspicuous, widely gaping perforations in the branched, septate capillitium—strongly suspect conspecificity with the well-known *Calvatia rugosa* (Berk. & M.A. Curtis) D.A. Reid. Should that be the case, the name *C. sericella* will enjoy priority over *C. rugosa,* since its basionym (*L. sericellum*) antedates the basionym of *C. rugosa* (≡ *Lycoperdon rugosum* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10: 345. 1868) by 17 years. Molecular analysis of the relevant type specimens should throw more light on this intriguing question.

4. A matter of orthography: '*versispora*' or '*versipora*'?

The fungus originally described by Lloyd (1915: 7–8) as *Calvatia versipora* does not belong to the *Lycoperdaceae* at all. It is, in fact, the anamorph of *Laetiporus sulphureus* (Bull. : Fr.) Murrill (Kreisel et al. 1983, Stalpers 1984, Reid 1985), which Stalpers (1984) transferred to the genus *Sporotrichum* Link : Fr. [as *Sporotrichum versisporum* (Lloyd) Stalpers].

According to Lloyd (1916), the name *C. versipora* was an '...original blunder...' and he therefore suggested a change to *Calvatia versispora* since that '...would better indicate the idea....' According to ICBN Art. 51.1 and 60.1, however, changes such as this are not permitted. Nonetheless, various later authors such as Stevenson & Cash (1936), Kreisel et al. (1983), Stalpers (1984), and Reid (1985), adopted Lloyd's proposed 'correction.' Stalpers (1984) defends this as follows: 'The code allows the correction of printing errors and thus the epithet '*versispora*' is used....' Perusal of Lloyd's (1915) original publication revealed, however, that the name of this fungus appears in print not only once, but at least three times (once on p. 4 and twice on p. 7) and, in all cases, as '*versipora*'. As a result of this consistent use by Lloyd (1915), we are much more inclined to believe that the use of the original '*versipora*' was intentional, and that it should not merely be dismissed as a correctable typographic error. We have little doubt that the blunder referred to by Lloyd (1916) represents an error of semantics and not of typography. Consequently we believe that Lloyd's original spelling should also be retained in later combinations derived from the original name.

5. Correct author citation for the superfluous combination *Calvatia bovista* (Pers. : Pers.) Kambly & Lee

T.C.E. Fries's (1921) transfer of *Lycoperdon bovista* Pers. : Pers. to the genus *Calvatia* [as *C. bovista* (Pers. : Pers.) T.C.E. Fr., an illegitimate later homonym of *C. bovista* (L.) T. Macbr.] went unnoticed by many authors, including Kambly & Lee (1936) who, in their paper on the gasteromycetes of Iowa, also made the transfer and have since then often been credited with the combination *Calvatia bovista* [basionym: *L. bovista* Pers. : Pers. {= *Calvatia utriformis* (Bull. : Pers.) Jaap}], not to be confused with *Calvatia bovista* (L.) T. Macbr. [≡ *Lycoperdon bovista* L. {= *Calvatia gigantea* (Batsch : Pers.) Lloyd}]. Kambly & Lee's combination is, however, illegitimate on two counts: (1) it is superfluous and (2) (like the Fries combination) it is a later homonym of *C. bovista* (L.) T. Macbr.

Establishing the correct author citation for Paul Kambly and Robert E. Lee's isonym proved to be an unexpected and time-consuming irritation. Throughout the literature, the name has merely been cited as "*Calvatia bovista* (Pers. : Pers.) Kambly & Lee." With Brummitt & Powell (1992) listing no fewer than 29 Lees as authors of plant names, the abbreviation requires some refinement. Unfortunately, however, Brummitt & Powell (1992) list not one, but two authors as Robert E.... Lee, neither of whom is cited as an author of fungal names. Robert Edward Lee is listed for his algal names, while Robert Edwin Lee is remembered as an author of spermatophyte names. Who then collaborated with Kambly on the 1936 paper on the gasteromycetes of Iowa? Was it Robert Edward, Robert Edwin, or someone entirely different? The literature available to us yielded no clues.

The problem was eventually solved after repeated enquiries revealed the existence of a 1932 MS thesis on gasteromycetes by one 'Robert Edward Lee' in the University of Iowa library. This 'discovery' left us with little doubt that Robert Edward was our man and that the correct author citation for Kambly & Lee's illegitimate combination should be *Calvatia bovista* (Pers. : Pers.) Kambly & R.Ed. Lee.

6. The status of *Calvatia gigantea* in South Africa

Bottomley's (1948) inclusion of *C. gigantea* in her list of South African gasteromycetes was based on a single, late 18th century, Thunberg collection of a specimen(s?) found in June in hilly terrain outside Cape Town (Thunberg 1800, 1823). Thunberg's designation of his material as *Lycoperdon bovista* sensu Linnaeus (= *C. gigantea*) was an error, but understandable for the time. It is inexplicable however, how this error could have been perpetuated in Bottomley (1948), which has led to other authors (e.g. Kreisel 1992, 1994) also citing *C. gigantea* as occurring in South Africa. Thunberg (1800, 1823) described his material as follows: '...globosum, lacero-dehiscens, stipite validissimo, clavato-

ventricoso, carne alba, seminis atris.' The reference to 'white flesh' indicates an immature specimen, which would have made identification difficult. The distinct stipe, however, clearly excludes Thunberg's material from the stipeless *C. gigantea,* which is, apart from Thunberg's record, not known to occur in the Cape Town area or anywhere else in South Africa. Thunberg's description is, however, very reminiscent of an immature *Calvatia cyathiformis* (Bosc) Morgan, which is, from our own experience, the most common large puffball occurring in the Cape Peninsula area. We would be surprised if the Thunberg specimen did not represent an immature *C. cyathiformis* specimen.

Thunberg's collection does not seem to have survived. In the Thunberg herbarium at UPS there is only a single sheet (no. 27495, with no locality indicated) filed under *Lycoperdon bovista.* A photograph of the sheet clearly shows the specimens mounted on it to be globose, stalkless, and dehiscing by means of a relatively wide ostiole. These are characteristics of *Bovista,* and the sheet also bears the inscription '*Bovista nigrescens*.' In addition to the missing locality information on the sheet, the stalkless nature of the specimens at UPS clearly separate them from Thunberg's '*L. bovista*' specimen(s?) from the Cape.

In July 1985 a huge puffball, unfortunately still immature but macroscopically very reminiscent of *C. gigantea,* was collected in a garden in Durban (T.D. Steinke s.n.) and sent to PREM for identification (PREM 48248). A small piece of the carpophore was later sent to Kew, on which Dr. Derek Reid commented in a letter to the PREM correspondent (copy of letter filed in the *Langermannia* sp. nov. file at K!): 'It is not *L. gigantea*...' because the spores '... are smaller and much less ornamented... [and] ...the capillitium is also perforate.' He concluded: '... I am inclined to agree with you that the specimen may well represent a new species of *Langermannia* but I feel it would be unwise to describe it on this abnormal specimen.'

No other southern African material of *C. gigantea* could be found in any South African herbarium, and a search at K also failed to locate anything from the African continent. A specimen from Kenya in a box at K, labeled *Langermannia gigantea*, represents *Calvatia argentea* (Berk) Kreisel. The U.S. National Fungus Collections also contain no record of this fungus from Africa (Farr & Rossman 2006). Therefore, in the absence of any substantiating evidence, the occurrence of *C. gigantea* in South Africa remains unconfirmed.

7. Identity of *Lycoperdon sinclairii* confirmed

Calvatia sinclairii (Berk. ex Massee) Lloyd, Lycoperd. Australia: 37. 1905.

≡ *Lycoperdon sinclairii* Berk. ex Massee, J. Roy. Microscop. Soc. London 1887: 716. 1887.

Holotype — New Zealand, Nelson 1500 ft., on the ground, Sinclair s.n. [K!]

Calvatia sinclairii has in the past been cited as a synonym of *C. utriformis* (Kreisel 1962, Zeller & Smith 1964) and, according to Demoulin (1971),

it is close to *C. utriformis*. Kreisel (1989), however, regarded it as a doubtful synonym of that species. After having had the opportunity to examine the type specimen at K, however, we are confident that *C. sinclairii* is conspecific with, and should indeed be regarded as a later synonym of, *C. utriformis*.

8. On the status of *Calvatia purpurea*

"***Calvatia purpurea***" (O.F. Müll. : Fr.) I.R. Hall, P.K. Buchanan, Y. Wang & A.L.J. Cole, Edible and poisonous mushrooms: 174. 1998, **comb. inval.**

≡ *Clavaria purpurea* O.F. Müll., Fl.dan. 14: t.837 f.2. 1780 : Fr., Syst. Mycol. 1: 480. 1821.

This combination first appeared in a list of fungi published in Hall et al. (1998), and both MycoBank (http://www.mycobank.org, 30-3-2011) and Index Fungorum (www.indexfungorum.org, 30-3-2011) accepted it as a good name, citing it as "*Calvatia purpurea* (Lloyd) I.R. Hall, P.K. Buchanan, Wang{?} & Cole" with *Bovista purpurea* Lloyd as basionym. That, however, is not correct. The combination "*Calvatia purpurea*" was created unintentionally and is an error to be ignored. A mistake was made in compiling the list in Hall et al. (1998); the entry should have read *Clavaria purpurea* O.F. Müll. : Fr., not "*Calvatia purpurea*" (Dr. I.R. Hall, pers. comm.). Since the combination was published without indicating the basionym and as it is also not accepted by the authors who inadvertently created it, the name is invalid according to ICBN Art. 33.3 and 34.1(a).

9. Lectotypification of *Calvatiella lioui*

Calvatiella lioui C.H. Chow, Bull. Fan Mem. Inst. Biol., Bot. 7: 93. 1936.

Lectotype (**designated here**) — plate III of Chow (1936).

Calvatiella lioui was originally described from a single specimen found in the herbarium of the National University of Peking (Chow 1936). This specimen disappeared during World War II, however (Kreisel & Calonge 1993). In view of this holotype loss, the only remaining original material associated with the name is here formally designated as lectotype of *Calvatiella lioui* according to ICBN Art. 7.10, 7.11, 9.9 and 9.10. Based on the description and illustrations in Chow (1936), Kreisel & Calonge's (1993) relegation of *Calvatiella lioui* to synonymy under *Calvatia utriformis* certainly seems probable but, in the absence of the holotype, cannot be corroborated.

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